Policy Instruments for Coral Reef Management and their Effectiveness

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Abstract

The various issues affecting the health of coral reefs in the tropical world are many and complex, yet they can be grouped for analysis and policy formulation into "local" or "global". The local issues generally include physical destruction caused by fishing gear, mining, boats, anchors, divers, etc.; over-extraction and use by fishers and/or visitors; and pollution or sedimentation from local sources (shoreline development, boats, people and other causes). The global issues generally include warmer water and climate change; pollution from distant sources (rivers, upland areas, ships, industry); and storms, disease, crown-of-thorns and others. As issues become better understood and causes better known, it becomes easier to determine appropriate and effective policies, strategies and actions to address them.

Policies supporting coral reef protection and management are grouped into three categories – governance, regulatory (limits to access or use) and economic (incentives or disincentives) – and discussed in relation to local and global scales. Policies that support localized management mostly revolve around decentralization of authority to local governments and communities; use of marine protected areas and integrated coastal management regimes; various types of regulations governing use of an area or the resource; education; and appropriate economic incentives such as user fees, trust funds or compensation payments. Policies that support global (national and international) protection of reefs include international or national marine parks; transnational or national integrated coastal management programs; legal frameworks that recognize local management regimes; long-term lease agreements and management rights; education; valuation tools to raise awareness; privatization of common property; various national laws; bans on import/export of vulnerable species; pollution taxes; conservation tax write-offs; market entry fees; debt-for-nature swaps; carbon emission taxes and others.

The relative effectiveness of various policies and strategies is discussed in relation to management of coral reefs in several Philippine case studies. Marine protected areas are analyzed as management approaches that can work in a supportive policy context. Institutional arrangements that facilitate coral reef management in the Philippines and other countries are presented. Finally, a matrix analysis compares various, mostly successful, coral reef management projects or areas, with the whole range of potential policies and strategies in order to determine the relative effectiveness and importance of the policy/strategy mechanisms.

Introduction: Types of policy instruments

Policy instruments refer to tools and measures, which can be a set of actions (direct), or mere incentives or disincentives designed to provide directions to regulators to achieve designated outcomes. Policies for coral reef management will often lead to management strategies and actions, although policies are not interchangeable with the latter. Policies set the stage for management and provide direction and

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incentives. Policies are normally created in response to an understanding of issues and their causes, so that policies support actions to solve a problem, such as coral reef destruction, that results from any one of many causes.

The various issues affecting the health of coral reefs in the world are many and complex, yet they can be categorized into groups for analysis and policy formulation. Issues may initially be grouped as "local" or "global" and then further broken down as shown in Table 1. As issues become better understood and causes better known, it becomes easier to determine appropriate and effective policies, strategies and actions to address them.

and local governments. To be effective, national government must devolve jurisdiction to local governments and local governments must have the ability and desire to plan and implement MPAs. The effectiveness of this approach has been borne out in the Philippines and Indonesia where most effective coral reef management is being done within the institutional context of community-based and local government ordained MPAs (White et al. 2001). These two countries also have national MPAs that are effective but successes appear more difficult to attain at the national level of management. In contrast, the Great Barrier Reef Marine Park is considered highly effective but it is located in a developed country (Kelleher 1991). Policies that support local autonomy in managing coral reefs through

Table 1. Categories of issues affecting coral reefs and important causative factors

Scale	Broad Issues	1st level causes	2nd level causes
Local	Physical destruction from fishing gear, mining, boats, anchors, divers, other	Weak law enforcement and/or regulation	Lack of education and low awareness
	Over extraction and use by fishers and/or visitors	Open access and/or weak management	Food security, Poverty, Lack of alternatives to fishing, Low awareness
	Pollution or sedimentation from local sources (shoreline development, boats, people, other)	Weak law enforcement, regulation or monitoring	Low awareness, Cost of prevention, Difficulty of solution
Global	Warmer water and climate change	Uncontrolled carbon emission	Lack of alternative energy source, Waste
	Pollution from distant sources (rivers, upland areas, ships, industry, mining)	Deforestation, Dumping from industry and ships, Waste from cities and towns, other	Lack of monitoring, access control, law enforcement, policy, regulation and others
	Storms, disease, Crown-of-thorns and others	Natural events, climate change, pollution	Lack of monitoring, knowledge, prediction

Policies that address the broad issues shown in Table 1 can also be divided into "local" and "global" in a manner that roughly follows the kinds of issues to be addressed. A difference in the grouping for policies is that local will refer to the very local context of a reef area but global will refer to legal and institutional contexts at the national as well as the true global levels. A listing of policies for guiding coral reef management, grouped by type, is shown in Table 2, and the overall global and local issue and policy structure is shown in Figure 1.

Local management policies and their effectiveness

Governance policies

Governance policies that encourage marine protected areas (MPAs) as a basic approach to coral reef management emanate from national

MPAs also include strategies that support either more generalized coastal resource management (CRM) or integrated coastal management (ICM) programs that focus on multiple local government jurisdictions or ecological regions, such as the bay-wide management being tested in the Philippines (Figure 2) (Christie and White 1997; Chua and Scura 1992). Policies or strategies that operate through CRM or ICM programs often support successful MPA programs and generally include:

- Implementation of "best practices", such as well-managed MPAs, zoning, functional local resource management organizations, effective coastal law enforcement units, shoreline development plans and regulation, and other habitat management mechanisms particular to coral reefs (Figure 2) (Courtney and White 2000).

Table 2. Policies and strategies for coral reef management

Scale/ Level	Policy type	Potential policies and strategies
Local	Governance	Community-based, cooperative or local government marine protected areas Marine protected area networks Integrated coastal management planning and implementation Traditional natural resource management regimes Certification of coastal resource management (best practice) implementation Municipal fisheries management or stewardship councils Periodic monitoring (biophysical, socioeconomic, management/governance) Information networks that disseminate the results of monitoring Planning for biophysical effectiveness and geographical priorities Education support and programs to raise awareness and encourage action Valuation tools to raise awareness and incorporate economic analysis Penalties for non-compliance
	Regulatory (limits to access or use)	Ban on logging and destructive fishing techniques Restrictions to access through zoning, boundary demarcation Restriction to access through community-owned land or marine tenure Use of catch quotas, size limits, seasons for fishing Restrictions on fishing gear by type and place Rules and guidelines for visitor use of dive sites
	Economic incentive or disincentive	Sustainable tourism Dive or visitor fee or tax system Boat/gear permits or licensing with fees Community coastal resource management trust funds Price incentives to fishers using sustainable methods Compensation payments to local fishermen or traditional users Alternative livelihoods for coastal resource dependent communities Fines for non-compliance
Global and/or national	Governance	National and international policies on coastal and coral reef management International or national marine parks Marine protected area networks Transnational or national integrated coastal management programs Certification of best practices in coastal management, shoreline development Legal framework to facilitate and recognize local management regimes Training programs on coastal resource management Standardize management and evaluation approaches and rating criteria Standardize criteria for management site selection Standardize biophysical and management descriptions and rating systems Long-term lease agreements and management rights Education support and programs to raise awareness and encourage action Valuation tools to raise awareness and incorporate economic analysis
	Regulatory (limits to access or use)	Privatization of common property, freehold property permits Laws controlling land-based pollution Laws banning or controlling destructive fishing techniques Ban import/export of vulnerable species and trade regulation Human population management
	Economic incentive or disincentive	Sustainable tourism Eco labeling for sustainable practices Pollution taxes based on "polluter pays principle" Conservation tax write-offs and market entry fees Debt-for-nature swaps Reduction of government land rents, fees, taxes as conservation incentive Reforms that improve security of tenure and the investment climate Carbon emission taxes and alternative energy sources

Supporting references:

Barber and Pratt 1997
Bettencourt and Gillett 2001
Bryant et al. 1998
Burke et al. 2001
Calumpong 1996
Cesar 1996
Cicin-Sain 1993
Courtney et al. 2000
DENR et al. 2001b
Gustavson and Huber 2001
Hatziolos et al. 1998
Huber 2001
Kuperan et al. 1999
Mascia 2001
Murray et al. 1999
Oracion 2001
Ross et al. 2001
Seenprachawong 2001
Spurgeon 2001
White et al. 1994
White and Trinidad 1998
White et al. 2001

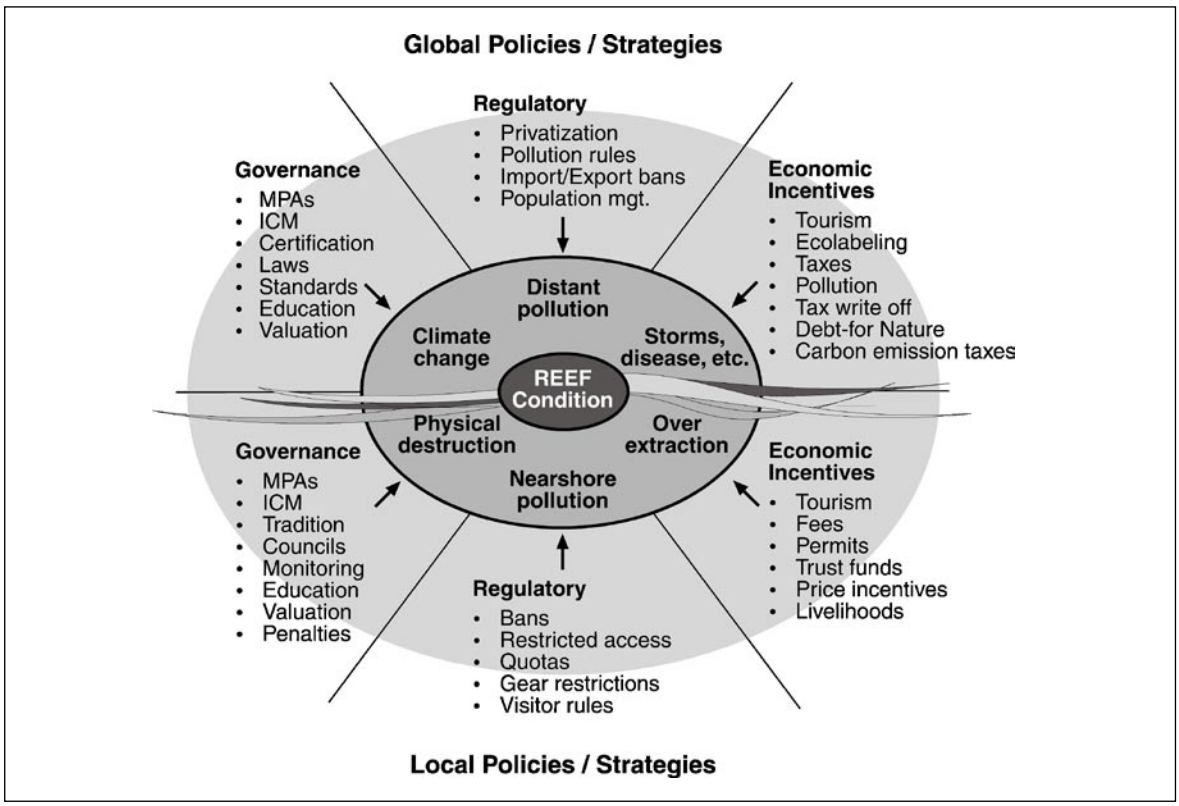


Figure 1. Global and local issues and policy structure for reef management

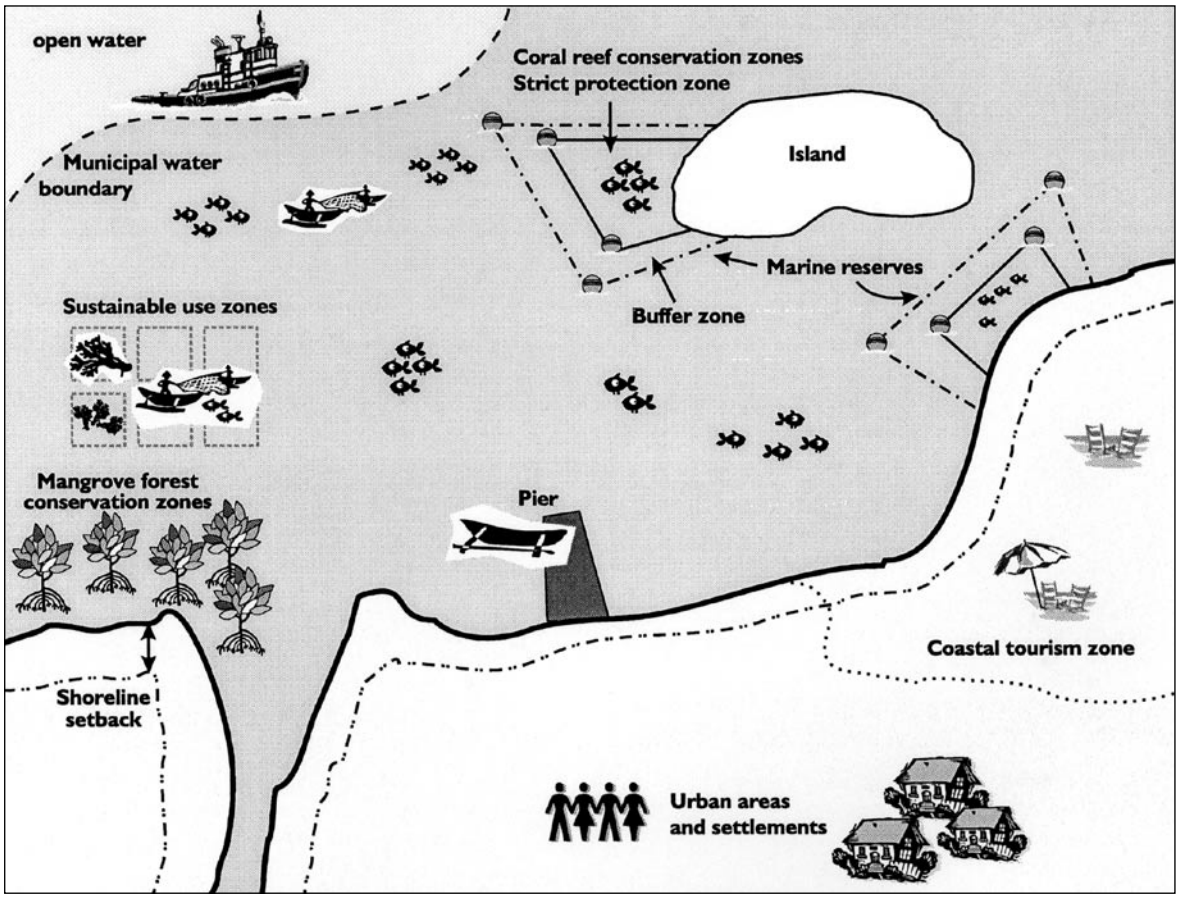


Figure 2. Planning and zoning of municipal water use in a typical Philippines bay or coastal area

- Certification of coastal management plans and their implementation through local government units (Courtney and White 2000).

- Periodic monitoring of coral reef biophysical, socioeconomic and governance impacts and context through local participatory means that raises awareness about the situation among local resource users and also gathers essential information for management and refinement of plans and actions (Uychiaoco et al. 2001). A typical planning cycle that incorporates the results of monitoring for management is shown in Figure 3.

Education is also part of the CRM planning cycle illustrated in Figure 3.

Regulatory policies

Regulatory mechanisms are many, and yet few are successful at achieving their intended result. This is probably because most regulations are implemented without the prerequisite education and consensus-building processes that will help ensure compliance. Regulatory policies almost always limit access and use in some form but they must be locally acceptable to be effective. Typical regulations used to help protect coral reefs are:

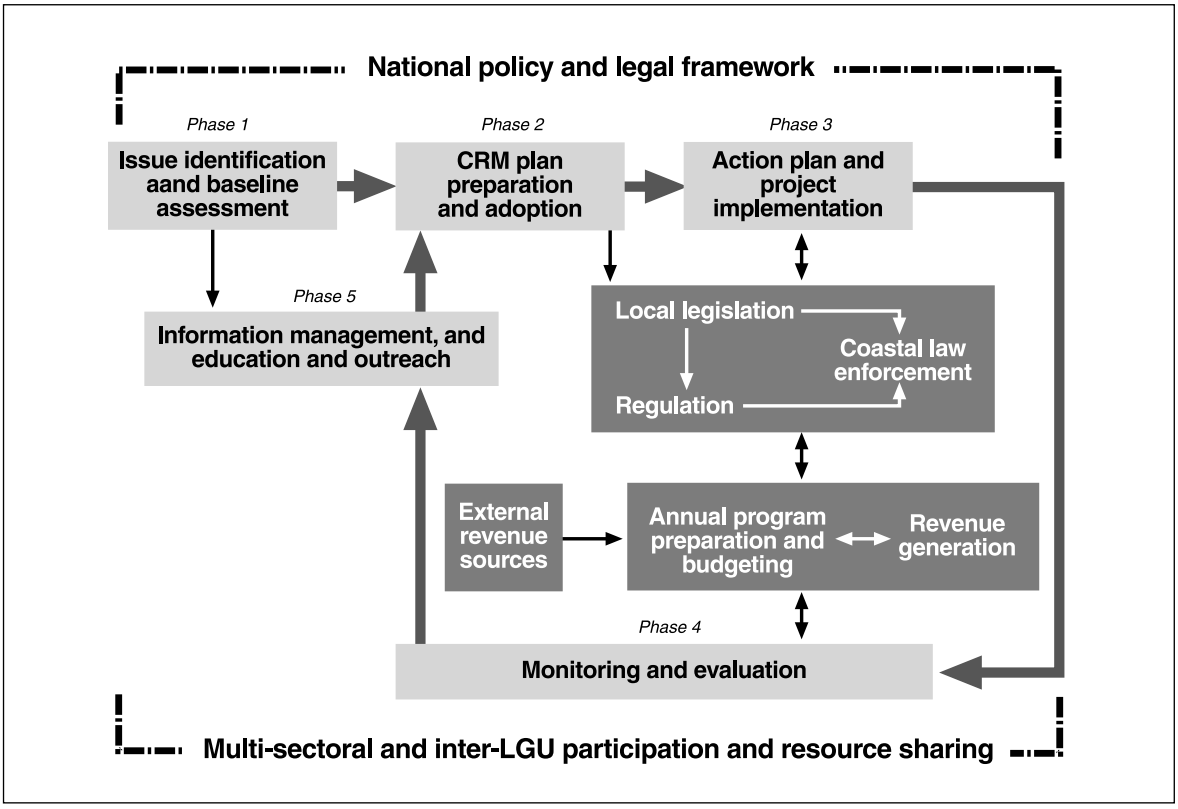


Figure 3. Coastal resource management planning and implementation cycle for a local government unit

Education is needed to reinforce positive actions at all levels and among all stakeholders. Education is a tool that must fit into the local context and that is more effective if driven by actual experience rather than by theory or ideas that are not easily comprehended by those expected to change their patterns of behavior (Wells and White 1995). Education can also make use of information from resource economic valuation and benefit analysis to raise awareness about the inherent values of the reef resources or area of concern. The role of education is illustrated in Case study 1 below.

- Bans on resource use activities such as logging and on use of destructive fishing methods. Such bans are common and necessary yet they are often ineffective because of poor education and acceptance among the target audience (Pomeroy and Carlos 1997).

- Regulatory limits to access and use for fishers or visitors. These are proving to be effective if implemented through a MPA approach that is specific for small areas, as shown in the case of functional MPAs in the Philippines where various rules are accepted and followed.

- Use of catch quotas, size limits and seasons for fishing. These methods are generally not effective tools in developing countries because of the difficulty of implementation and enforcement (Pomeroy and Carlos 1997) in situations where there is no appropriate government bureaucracy. Even in places like the Great Barrier Reef or Florida there are still problems with monitoring compliance.

- Restrictions on fishing gear by type and place. These are often effective in the context of localized management implemented by local governments or through MPAs but are often difficult to monitor in large areas due to lack of government capacity. Private sector cooperation through the dive industry or local management organizations can enhance the enforcement of fishing restrictions.

Economic incentives

- Use of economic incentives and disincentives is a valuable tool in making MPAs effective and also attractive to users such as visitors or local fishers (Cesar 1996; Arin 1997; White and Trinidad 1998). In the local context, economic incentives must operate so that they directly reinforce conservation practices through the local resource users (Vogt 1997). The economic incentive should be linked directly to a resource user behavior pattern that requires changing or reinforcement so that the connection is very clear. Options for economic incentives include:

- Sustainable tourism – often a strong positive economic incentive for protecting coral reefs as long as the tourist is really interested in visiting healthy reefs (White et al. 2000). Setting up user fee systems can reinforce good behavior by placing value on the site of visitation and also provide revenue to manage a special area. Entry permits for boats can have the same positive effect and help control activities of the boat owners while in a limited access area.

- Community trust funds – may be more complicated to set up and manage but still have potential where the community has decided to manage an area and is able to collect user fees that are managed through a communal system. Such a community-based system is working in some areas where the community is well organized and there is no problem of too much government intervention.

- Compensation payments to local resource users – may help initiate a conservation program but might not be sustainable unless the compensation comes from revenue that is generated from sustainable tourism or another related source.

- Alternative livelihood projects for fishers dependent on reefs – often do not work as intended and many times end up assisting the wrong beneficiaries. Thus, all livelihood projects must be carefully planned and tested to ensure that they do indeed support better conservation by benefiting the targeted stakeholders of concern to reef management. Livelihoods that are working in the Philippines to support reef conservation are tourism-related or environmentally friendly forms of aquaculture that can be implemented without too much capital or training.

Economic disincentives can also have a beneficial effect on reef management if implemented consistently in the context of law enforcement. Even community-based management regimes use fines for offenders of marine sanctuaries or fishing gear rule infractions. Local governments in the Philippines are increasingly collecting fines for illegal fishing (Courtney et al. 2002).

Global/national management policies and their effectiveness

Governance policies

Policies that truly emanate from the global level are those embodied in the Earth Summit, Agenda 21, Chapter 17 that addresses the conservation needs of oceans and coasts. The overall thrust of Chapter 17 is to promote the integrated management of coastal areas and resources following the guiding principles of sustainable use and development (Cicin-Sain 1993). Most of the key principles and concepts of good coastal resource management are expressed in Chapter 17, but what is of relevance to this paper is how these policies affect coral reefs within the national and local context. Important governance policies and strategies at the global and/or national levels with practical implications for improved management and conservation include those listed in the following page.

- International agreements covering trans-national areas and creating international marine parks, such as the Turtle Islands National Park which is jointly implemented by Malaysia and the Philippines, or the proposed Spratly Islands International Marine Park in the South China Sea. There are few effectively managed areas that cross national borders but there is potential for such management regimes in future.

- National laws, guidelines and certification systems that establish and support integrated coastal management approaches, national marine parks or other similar management approaches. These are often essential ingredients in supporting effective local management. The ability to transpose national legal support into effective local action is still lacking in most countries, although good examples exist in Australia, Indonesia, Malaysia, Thailand and the Philippines in a few well-known and high priority sites. A national CRM certification system is now being tested in the Philippines (Courtney et al. 2002).

- International and national training programs in ICM, MPA management, monitoring and evaluation or other technical and governance techniques. Such programs are important in building capacity in the government and private sector for improved CRM. An important aspect of training is dissemination of standardized management and evaluation approaches, rating systems for governance in MPAs or CRM programs, criteria for site selection of MPAs, and methods used for biophysical, socioeconomic and governance monitoring. At present, in most countries, such standards are lacking and training is being done using non-standard methods. This makes information sharing difficult and ineffective.

- Access and management rights. These policy tools are affected by national policies controlling the devolution of authority. In some countries, traditional use rights are awarded to indigenous communities for shoreline and marine areas. This does not always mean improved management but it does offer some local accountability for management and is effective in some Pacific island countries (Bettencourt and Gillet 2001; Hviding and Baines 1992; Hviding 1991).

- National education programs for coral reef conservation and management. These exist in varying capacities in many countries. The extent to which they have a lasting and positive impact depends on the degree to which they are integrated into school curricula and national media outlets. All successful coral management programs have strong, ongoing education components. Certainly, the general awareness about the importance of coral reefs is much higher now than it was a few years ago; much of this can be attributed to the dissemination of information on the relative economic value of reefs to policy-makers, government agencies and the general public (Courtney et al. 2000).

Regulatory policies

Global and national regulatory policies are primarily reflected in, amongst other things, international trade and pollution control agreements as well as in national laws that regulate trade and use of species, use of fishing methods, laws controlling landuse and land-based pollution. One trade agreement that is relatively effective is the inclusion of corals in Appendix 3 of the Convention on International Trade in Endangered Species (CITES) under which shipment of corals is inhibited internationally. Yet, the best enforcement comes when national laws prevent both export and import of corals directly so that national customs officials are more vigilant. Having clear regulatory policies and laws at the national level makes it easier for effective enforcement at the local level. An example of an unclear national law is when the law states that all "active fishing gears" are prohibited from use in municipal coastal waters (including all coral reef areas) but fails to define "active fishing gears" or leaves the definition to the discretion of local governments, as in the Philippines. Unclear laws usually lead to poor or no enforcement.

Economic policies

An important international and national economic policy that can assist directly with reef conservation is the promotion of sustainable tourism. Tourism as an economic force cannot be disputed and, when harnessed to support conservation in the right manner, it can be beneficial, especially if it is linked to effective local management policies that ensure distribution of benefits among coastal resource

stakeholders. National tourism promotion may benefit well-managed national marine parks but might be detrimental to local MPAs if the local authorities and communities cannot manage the influx of tourists and derive economic benefits from them in an equitable manner (White et al. 2000). Other international or national economic policy incentives or disincentives may include:

- Pollution taxes by which polluters pay either for emissions to marine waters or for specific damages to coastal waters and reefs. This mechanism is difficult to implement in developing countries and is probably not very effective in terms of reef conservation anywhere except maybe in Australia and the United States where ships dumping wastes or directly breaking the reefs have been fined under the law.

- Conservation tax write-offs and market entry fees. These mechanisms are used in developed countries in certain circumstances but their effectiveness may be difficult to measure and they may not work in developing countries.

- Debt-for-nature swaps and incentives for investments that support conservation. Such measures have been used to generate revenue for conservation in developing countries where the government allows and encourages retirement of public or private debt, or has progressive investment policies. The combination of factors and cooperation to make such arrangements work in reality is rather complex and the overall use of these tools has not been great.

- Finally, at the truly global level, the need to cut carbon emissions is recognized but is making little headway in the international arena. Certainly the most promising solution here will be alternative energy sources that depend less on fossil fuels than at present.

Case study 1: Local government and community coral reef management in the Philippines

Owing to years of neglect and mismanagement, the condition of coral reefs and other coastal resources in the Philippines declined significantly until about 1985. Since then, over 430 MPAs have been established in the country (Baling 1995; Pajaro et al. 1999; White et al. 2001). Presently, the degradation of the reefs has slowed down and, although many are not well managed, the MPAs are having a positive effect and the level of awareness nationwide has improved. With the passage of the Local Government Code in 1991 and the 1998 Fisheries Code responsibility for managing municipal waters and their resources was devolved to local governments. However, local governments often lack technical capacity, funds, and economic justification to support investment in coastal resource management. Co-

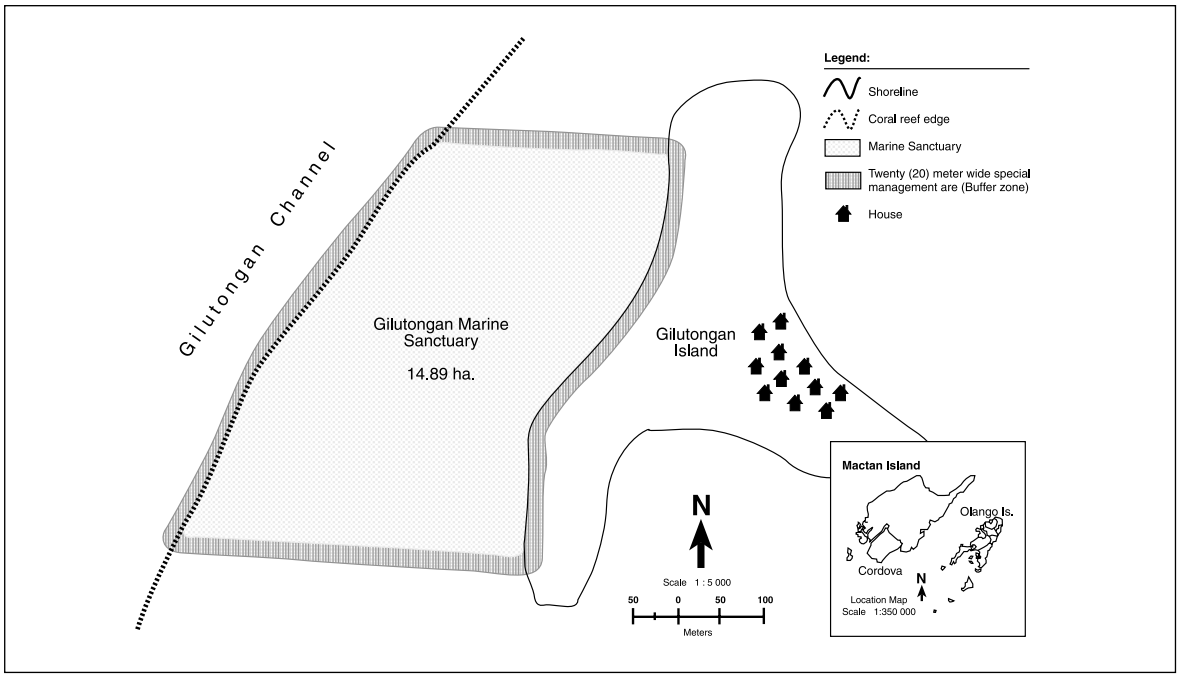


Figure 4. Gilutongan Island Marine Sanctuary, Cordova, Cebu, Philippines

management projects, such as the Coastal Resource Management Project (CRMP) in Cordova, Cebu, have helped to coordinate government and academic expertise to assist local communities manage their coastal resources better (Courtney and White 2000).

The boundaries of the Gilutongan Marine Sanctuary in Cordova were officially established by a municipal ordinance in 1994 (Figure 4). However, the sanctuary has only recently become effective with active involvement by the community, national and municipal governments, non-government organizations (NGOs) and academic institutions. The National Department of Environment and Natural Resources, the University of the Philippines, the Marine Science Institute and the University of San Carlos are monitoring the coral reef substrate and fish abundance, activities the community does not have the expertise to perform. However, because the management is community-based, the risk of local resource conflicts and non-compliance is reduced.

Early results have been positive. Fish abundance and diversity and live coral cover have improved markedly (Figure 5). Study tours from other coastal communities and tourism in general are growing as well. Revenues from the recreational diving industry are generating on average US$1 000 a month, of which 70 per cent is allocated to the municipality to support marine sanctuary management and 30 per cent is allocated to the community for special improvement projects (Ross et al. 2001).

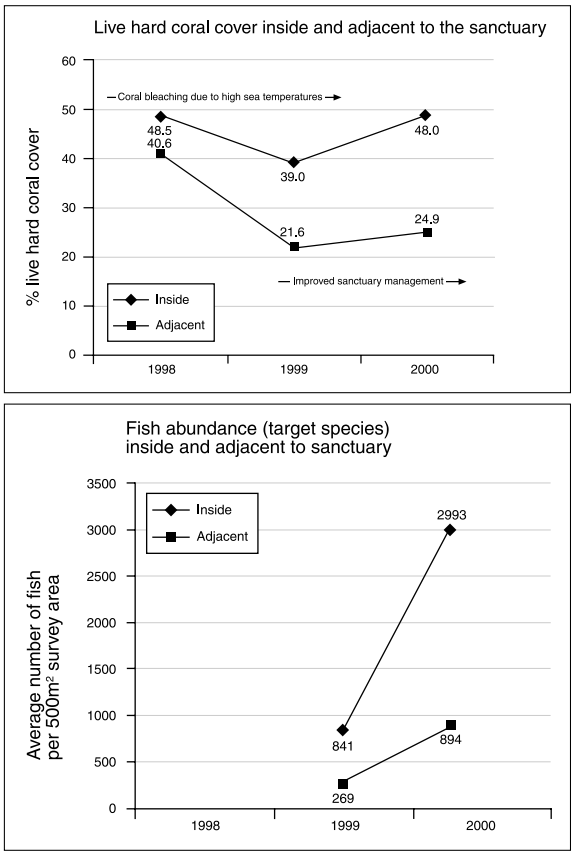


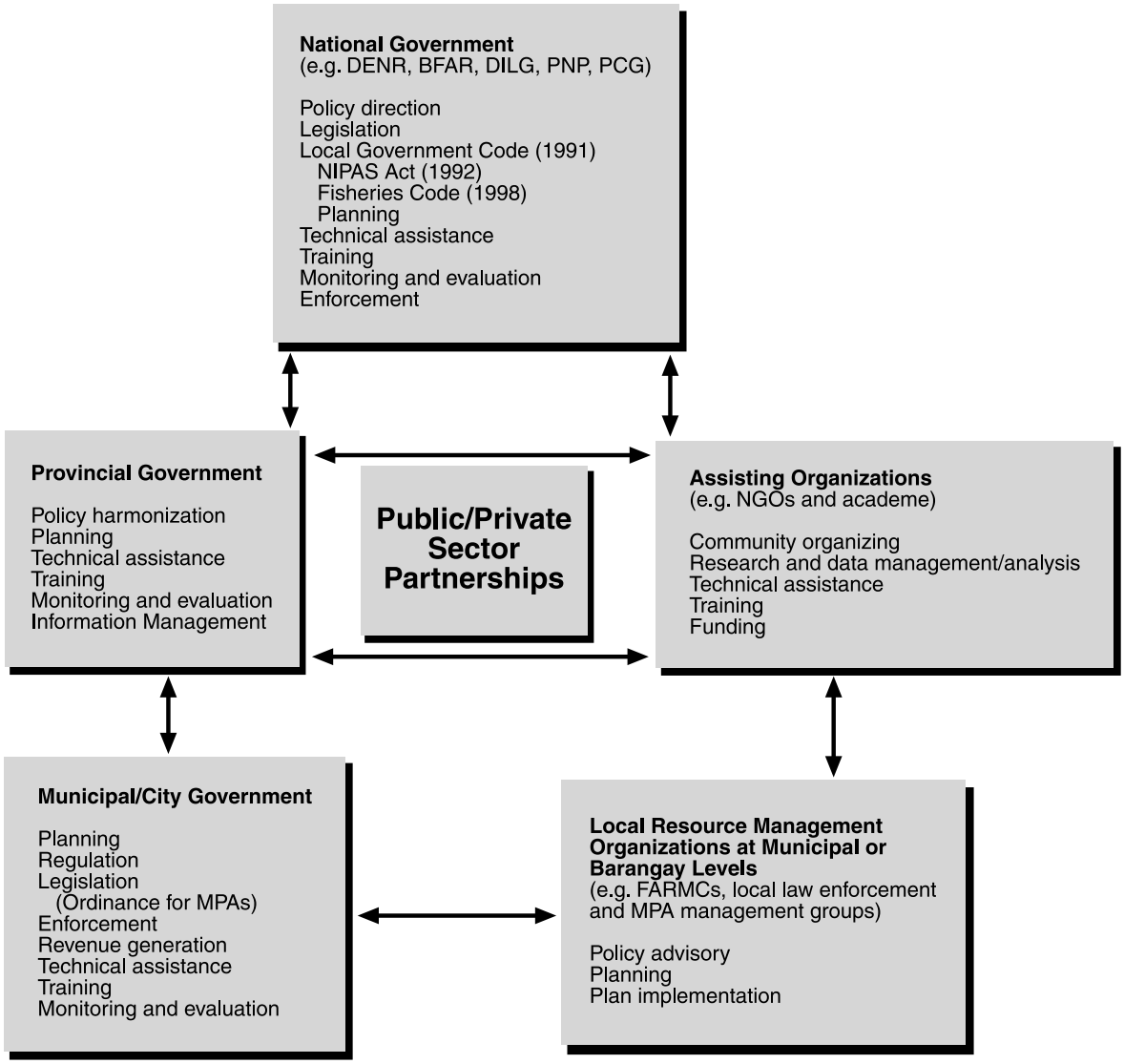
Figure 5. Change in coral cover and fish abundance in Gilutongan Island Sanctuary

CRMP has been working with municipalities and communities such as Cordova in other parts of the Philippines to build the capacity of local governments to deliver coastal resource management as a basic service. By the end of 2001, 70 municipal governments, covering more than 2 100 kilometers of shoreline, will have adopted a rigorous CRM system.

Precursors to Gilutongan Island Marine Sanctuary, Apo, Pamilacan and Balicasag Islands and others in the Central Visayas, Philippines, are also recognized as successful community-based resource management projects. In the late 1970s, blast and dynamite fishing, as well as other destructive fishing practices, threatened these and other reefs in the Central Visayas. Thanks to a community-based marine management initiative that controlled destructive fishing practices, put in place in the mid 1980s, these practices stopped (MCDP 1986). With financial assistance, Silliman University staff organized local people on these islands into marine management committees. These groups then set up marine reserves that included "no fishing" sanctuaries on one part of the reef. With the assistance of the municipal governments, residents have continued to prevent reef damage from fishers and divers both within and outside the sanctuaries (White 1988a; 1988b; 1989; 1996). A growing tourism industry catering to scuba divers is providing much needed revenue to local communities. In 1999, live coral cover and fish populations within the marine sanctuaries had increased substantially, along with fish yields from the island reefs (White et al. 1999; White and Vogt 2000).

Case study 2: National coral reef management in the Philippines

Policies supporting the three overall strategies prevalent in Southeast Asia – integrated coastal management, community-based coastal management and co-management – delegate the power to manage coastal resources to different groups. With top-down strategies, governments retain



BFAR	- Bureau of Fisheries and Aquatic Resources
DENR	- Department of Environment and Natural Resources
DILG	- Department of Interior and Local Government
FARMC	- Fisheries and Aquatic Resources Management Council
NIPAS	- National Integrated Protected Area System
NGO	- Non-government Organization
PCG	- Philippine Coast Guard
PNP	- Philippine National Police

Figure 6. Key institution roles and responsibilities for local level coastal management in the Philippines

most of the control. Following the trend of decentralization, especially in the Philippines, NGOs and local authorities have developed community-based management and co-management regimes. This devolution of power makes local communities, and municipal and city governments, crucial actors in the management of coastal resources (Figure 6).

The major policies that affect coral reef management are the Republic Act (RA) 8550 or the Philippines Fisheries Code of 1998 and RA 7160 or the Local Government Code. The relevant provisions of the Fisheries Code are:

a) A ban on coral exploitation and exportation. It is prohibited for any person or corporation to gather, possess, sell or export ordinary

precious and semi-precious corals, whether raw or in processed form;

b) A ban on muro-ami, other methods and gear destructive to coral reefs and related marine habitat. It is unlawful to fish with a gear method that requires diving and other physical or mechanical acts that pound and destroy coral reefs, seagrass beds, and other marine life habitat;

c) The prohibition of fishing or taking of rare, threatened, or endangered species as listed in CITES (which includes species of corals);

d) The declaration of fishing reserves. Local Government Units (LGUs) are authorized to recommend to the Department of Agriculture (DA) portions of municipal waters that can be declared as fishery reserves; and

e) The establishment of fish refuges and sanctuaries. LGUs are authorized to establish these within their municipal waters.

Meanwhile, the Local Government Code establishes the jurisdiction of municipalities in the management of its municipal waters, where some coral reefs are found. The functions of LGUs relevant to coral reef management are:

a) Enforcement of all national laws on fishery and coral reef conservation including ordinances;

b) Legislation of ordinances that limit destructive activities on coral reefs, such as those associated with fishing (spear fishing by recreation divers) or tourism (anchoring, entrance fees in marine sanctuaries, etc.);

c) Inter-LGU collaboration which enhances implementation of integrated management;

d) Consultation of national government agencies with LGUs, NGOs and other stakeholders in relation to programs or projects which may cause pollution, climate change, depletion of non-renewable resources or any activities which would cause ecological imbalance;

e) Recognition of the roles of peoples' organizations and NGOs as the backbone of participatory planning; and

f) Power to generate their own sources of revenue, e.g. charging entrance fees for marine parks.

The National Integrated Protected Areas System (NIPAS) Act is also an important policy support for coral reef management. The NIPAS has included in its system 13 marine seascapes (Table 3) of notable biological and physical diversity. One of these seascapes is the Tubbataha Reef National Marine Park, which is also a World Heritage Site due to the unparalleled beauty and biodiversity of coral reefs in the area. The NIPAS further provides for a degree of interface with the LGUs through membership in the Protected Area Management Board (PAMB) and consultations before enlistment in the system. Although a progressive law, the NIPAS Act has had the effect of alienating some community groups from a previously successful management operation. The well-known Apo Island in the southern Philippines is a case in point. There, the successful community-based and local government-run marine reserve of the 1980s was declared a Protected Seascape under the NIPAS Act in 1996. Since 1996, the community has complained of problems of working within the national system and, in fact, the revenues collected from visitors to the island have largely been lost in the national treasury through the poor management of the DENR. This highlights the potential weakness of an apparently good national law for protected areas that in theory involves local government and communities in the planning and management process but in practice does not do so. Also, as can be seen from Table 3, management is not effective in most of the nationally protected seascapes, thus reinforcing the notion that national policies/laws are not effective without local mechanisms and accountability (NIPAP 1999; White et al. 2001).

The Philippines has various other environment and pollution prevention policies of importance to coral reefs, especially as the reefs function as recipients of silt and polluting materials. Such policies as they apply to shoreline development, forestry, and disposition of solid waste are all highly relevant to coral reef management but are woefully lacking in enforcement.

While it is clear that local level management of coral reefs is the mandate of the LGUs, the functional overlaps and interests of national agencies blur the issue. The Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) has general responsibility for the management of fishery management areas, while the Department of Environment and Natural Resources (DENR) has jurisdiction over the entire natural resources and environment

Table 3. Nationally proclaimed marine protected areas in the Philippines and their effectiveness[1] (DENR 2001)

Name of protected area	Date established	Area (hectares)[2]	Approximate reef area	Relative protection from protected area status[3]
Palaui Island Marine Reserve, Luzon	08-16-1994	7 415	<10%	❖
Batanes Protected Landscape and Seascape, Luzon	02-28-1994	213 578	<5%	❖
Masinloc and Oyon Bay Marine Reserve, Zambales	08-18-1993	7 568	<5%	❖
Tubbataha Reef National Marine Park, Sulu Sea, Palawan	08-11-1988	33 200	>10 000 ha	❖ ❖ ❖
Apo Reef Natural Park, Sulu Sea, Mindoro	02-20-1996	11 677	>3 000 ha	❖ ❖
Taklong Island National Marine Reserve	02-08-1990	1 143	<10%	❖
Sagay Protected Seascape, Negros Occidental	06-01-1995	28 300	<10%	❖
Apo Island Protected Landscape and Seascape, Negros Oriental	08-09-1996	691	=100 ha	❖ ❖ ❖
Guiuan Protected Landscape and Seascape, Samar	09-26-1994	60 448	<10%	❖
Turtle Island Heritage Protected Area, Tawi-Tawi	05-31-1996	1 740	<10%	❖ ❖
Pujada Bay Protected Landscape and Seascape, Mindanao	07-31-1994	21 200	<10%	❖
Sarangani Protected Seascape, Mindanao	03-05-1997	215 950	<5%	❖ ❖
Tañon Strait Protected Seascape, Negros/ Cebu	05-28-1998	No data	<5%	❖

1 There are many more marine protected areas established by municipal or city ordinance that are not listed here. About 10 to 15 per cent of the local government MPAs are considered to be managed effectively.
2 Area includes all marine waters of protected areas, generally less than 10% is coral reef habitat.
3 ❖ Little or no management
❖ ❖ Management starting
❖ ❖ ❖ Effective management in place for several years

sector. A positive legal agreement that emerged despite this seeming confusion is the Joint Memorandum Order No. 2000-01 between DA-BFAR and DENR. The agreement, first and foremost, lays down procedures for cooperation and collaboration on matters that affect jurisdictional mandates of both agencies (DENR et al. 2001a).

In the Philippines, despite a strong legal and institutional framework for coral reef management, enforcement of the laws remains weak. Reasons range from mere lack of political will on the part of the enforcer, to total ignorance of the law or lack of appreciation of resource values on the part of stakeholders. Local governments complain that there is very little funding for enforcement and that hardware and personnel support from national government is minimal. Nevertheless, there are important policy shifts taking place for improving CRM in the country as indicated in Table 4.

In the Philippines, the future of coral reefs depends on the actions listed below.

- Implementing more effective MPAs and improving the quality of management of many existing but poorly managed MPAs under local and national governments;
- Promoting coastal resource management planning and implementation for all municipal and city governments that includes CRM best practices such as improved coastal law enforcement, zoning, MPAs, controls on shoreline development and collecting resource rents;
- Adopting a newly designed national policy framework for coastal management that streamlines the roles and responsibilities of various agencies that support local governments in the task of protecting coral reefs and other resources;
- Encouraging collection of resource rent in exchange for access to coral reefs and fisheries to obtain revenue for improved management and protection; and
- Continuing to educate the public and policy-makers about the importance of coral reefs in the local and national economy and about their high biodiversity values.

Table 4. Policy directions for improved local governance and coastal resource management in the Philippines (Courtney et al. 2001)

FROM → *TO*	
Improved local governance (adapted from Ellison 1997)	
Public administration Centralized, uniform, "top down" service delivery Self-sufficiency Hierarchical control "Upward" accountability Standardized procedures Apolitical civil society Individual skill building	Public management Decentralized, diverse, localized service delivery Inter-linked sectors Empowerment "Outward" accountability Performance orientation Advocacy-oriented civil service Organizational competence
Improved coastal resource management (adapted from Courtney and White 2000)	
Agri-based fisheries development National government control and regulation Top-down planning by national government Input indicators used to monitor activities Single local government interventions Individual skill building in CRM	Coastal resource management and protection Local government delivery of CRM as a basic service Upward, participatory planning and co-management regimes Output indicators used to benchmark local government performance Inter-local government and multisectoral participation in co-management regimes Organizational capacity building in CRM for local government, resource management councils, NGOs, civil society

Institutional arrangements that work for coral reef management

There are many different examples of institutional arrangements for managing coral reefs around the world. The Philippines examples above highlight the roles of communities, and local and national governments in a varying mix that is biased towards local level control, even in national marine parks. In Table 5, examples from around the world are summarized to give a sense of what can work under different governments and in various situations. One pattern that emerges from this summary table is that local accountability must always be in place whether it is orchestrated from national headquarters or from a local government or community. Thus, national management regimes in developed countries may appear to be more hierarchical but, in reality, if they are effective in management, they may have devolved much of their authority and responsibility to local management units that reflect local community and cultural needs. Another trend that emerges from the management cases of Table 5 is that there is always some form of collaborative management present. This may be in the form of collaboration between local or national governments and stakeholder communities, or it may be collaboration between the private sector and communities and/or government.

Table 5. Selected coral reef management programs and their type of institutional support and role of community (modified from White et al. 1994)

Local Community and/or Local Government Management

Site name	Area	Organization responsible	Management role of community
FIJI			
1. Customary fishing rights areas	Inshore areas up to reef drop-off	Local communities with government Fisheries Division	Owners of fishing rights must grant permission for activities that might affect reefs; joint government and community program to stop dynamite fishing with increased prosecutions.
MOZAMBIQUE			
2. Bazaruto Archipelago Conservation Project	Reefs and other marine habitats of five islands	Local tourism organizations and villages, with assistance of World Wide Fund for Nature and South African Nature Foundation	Through custodianship of resources and a joint decision-making process, residents have established five reserves on fringing reefs in which fishing is prohibited and four in which spearing ad seine nets are prohibited but other artisanal methods are permitted.
PHILIPPINES			
3. Apo Island Municipal Marine Reserve (until 1996)	106 ha of fringing reef reserve surrounding the island to 60 m isobath	Marine Management Committee of residents, municipal government, and Silliman University	Marking and guarding of sanctuary and regulation of fishing practices and tourist activities around the island.

4. Balicasag Island Municipal Marine Reserve	31 ha of fringing reef reserve surrounding the small island to 20 m isobath	Marine Management Committee of residents, municipal government, and the Philippine Tourism Authority	Guarding of sanctuary and prevention of destructive fishing.
5. Mabini Municipal Marine Reserve	Coral reef and marine waters to 500 m offshore fringing 4 km of coastline, with three sanctuaries inside	Marine Management Committee of fishers and resort operators, municipal government	Surveillance of sanctuaries, installation of mooring buoys, and prevention of destructive fishing.
6. Pamilacan Island Municipal Marine Reserve	180 ha of fringing reef reserve surrounding the island to 20 m isobath	Marine Management Committee of residents and municipal government	Guarding of sanctuary and regulation of fishing activities.
7. San Salvador Island Municipal Marine Reserve, Zambales	Fringing reef surrounding 300 ha island, 125 ha reef sanctuary	Marine Management Committee of residents, municipal government and the Haribon Foundation	Surveillance of sanctuary and monitoring of fishing activities on remaining fish areas.
8. Sumilon Island Municipal Marine Park	25 ha island surrounded by 50 ha coral reef	Municipal government and resort company	Municipal employees watch the reef to prevent destructive fishing and collect fees from tourists; sanctuary imposed until 1984. Monitoring showed dramatic increases in fish diversity, abundance and yield up to 1984.
SOLOMON ISLANDS			
9. Marovo Lagoon Customary Marie Tenure	700 km^2 of reefs and water enclosed by barrier reefs	Traditional chief oversees regulations; village communities control access to reef	Control access to reef resources and regulation of harvesting within community areas; may give fishing rights to outsiders under certain conditions.

National or State Government Management

Site name	Area	Organization responsible	Management role of community
AUSTRALIA			
10. Great Barrier Reef Marine Park	350 000 km^2 with about 2 900 reefs, 300 coral cays, and 600 continental islands	Great Barrier Reef Marine Park Authority and Queensland National Parks and Wildlife Services	Community or park users assist in determining activities within park zones; implementation through education, public awareness and enforcement as needed.
BELIZE			
11. Hol Chan Marine Reserve	Several small reef areas and sand cays	Fisheries Department	Fishing banned by government, and local fishers cooperate by not fishing within the reserve.
EGYPT			
12. Ras Mohammed Marine Park	170 km coastline with fringing reefs and desert landscape	Department of National Parks, with assistance of European Economic Community project	Tour companies cooperate with government office to monitor diving activities and mooring of boats.
INDONESIA			
13. Bali Barat National Marine Park, Bali	One small island and fringing reefs (sanctuary); fringing reefs and other marine ecosystems bordering mainland shore	Directorate of Nature Conservation within the Ministry of Forestry, park director, and staff	The park director works closely with local fishing communities in a cooperative manner to ensure compliance.
14. Bunaken National Marine Park, North Sulawesi	89 000 ha with five islands and two stretches of mainland shoreline with 5 000 ha of coral reefs and 1 800 ha of mangrove forest	Directorate of Nature Conservation within the Ministry of Forestry, park director, and staff	Several NGOs are beginning to work with the park management. Local participation is beginning through a planning process.
MEXICO			
15. Sian Ka'an Biosphere Reserve, Yucatan	528 000 ha of rain forest, mangroves, reefs , and associated waters, bounded by Yucatan barrier reef	Government department in cooperation with the NGO Amigos de Sian Ka'an	Fishing cooperative for spiny lobster and Council of Representatives of people living in the reserve participate in management with the government.
16. Key Largo National Marine Sanctuary, Florida	259 km^2 of patch and bank reefs, sea grass beds, and adjacent waters	Florida Department of Natural Resources	Surveillance and education; spearfishing and trap fishing prohibited; mooring buoys installed.

17. Looe Key National Marine Sanctuary, Florida	18 km^2 of reefs, sea grass beds, and associated waters	Florida Department of Natural Resources	Surveillance and education; spearfishing and trap fishing prohibited; mooring buoys installed.
18. Marine Life Conservation Districts, Hawaii	Nine areas ranging in size from 11 to 150 ha of coral reef and marine water	State Division of Aquatic Resources	Dive tour operators cooperate with state to manage sites on a case-by-case basis; fishing and anchoring banned; recreation permitted.
19. Virgin Islands National Park (VINP) and Biosphere Reserve, Caribbean	6 127 ha, including 2 286 ha sea, 3 644 ha land. Park has fringing reefs, mangroves, sea grasses, and associated waters and beaches	National Park Service, Department of Interior, with Virgin Islands Resource Management Cooperative	Park Service is encouraging participation of fisher groups through traditional fishing and planning; and NGO, Friends of the VINP, serves as a liaison.

Collaborative Management

Site name	Area	Organization responsible	Management role of community
BRITISH VIRGIN ISLANDS			
20. RMS Rhone Marine Park	323 ha, including the wreck, island, and surrounding waters and reefs	National Parks Trust, with participation of Dive Operatives Association	Local dive operators involved in surveillance, monitoring, education, and installation of mooring buoys.
HAITI			
21. Les Arcadins Marine Park	Islands with fringing coral reefs on west coast north of Portau-Prince	Government in cooperation with World Wildlife Fund	Fisher cooperatives, the Haiti Hotel Association, and local dive club, with assistance of World Wildlife Fund-U.S., are active in regulating fishing activities in the park with the implementation of no-fishing areas.
JAMAICA			
22. Montego Bay Marine Park	13 km^2 includes extensive coral reefs, sea grass beds, and mangroves	National government agency, with active assistance of NGOs	Dive operators have trained wardens; Rotary Club has raised funds; schools are involved in publicity and awareness-raising; local fishing cooperatives assist with fishing regulation and area-use monitoring; mooring buoys installed.
NETHERLANDS ANTILLES			
23. Bonaire Marine Park	Coral reef and marine habitat surrounding the island to 60 m isobath	An NGO, Bonaire National Parks Foundation (STINAPA), with local government support and assistance of local community groups	STINAPA, hotels, dive organizations, and the government are represented on the management committee; partially zoned with two scientific reserves.
24. Saba Marine Park	Entire nearshore environment of the island covering 870 ha	Saba Conservation Foundation with local government and dive operators	Zoned for diving, anchoring, and fishing; mooring buoys installed; permit system for dive operators; one-quarter of park closed to fishing with cooperation of fishers.
MALDIVES			
25. Maldives Resort Islands	Fringing coral reefs, beaches, islands, and surrounding marine waters zoned for tourism	Department of Fisheries and national resort organization	Resort and dive operators actively monitor use of reefs on their islands and dive sites frequented by their boats, in collaboration with Department of Fisheries.
MICRONESIA (Federated States)			
26. Kosrae Island	Fringing coral reefs, mangroves, and beaches bordering island	Island government and communities	Trochus shell sanctuaries are being maintained by communities where no collection is permitted; habitat protection is generally promoted, and fishing by outsiders is discouraged; locally managed tourism is being planned.
PHILIPPINES			
27. Tubbataha National Marine Park, Sulu Sea	32 200 ha, two atolls with lagoons, and fringing coral reefs	Protected Area Management Board (PAMB) of National and Local Governments, NGOs and stakeholder	The World Wildlife Fund for Nature actively supports, manages, and patrols to prevent destructive fishing, conducts education programs, and makes liaisons with dive operators and the Philippine navy under direction of the PAMB.

ST. LUCIA			
28. Soufriere	Fringing coral reefs along about 10 km of coastline on the west coast of St. Lucia	Department of Fisheries and dive operators	Dive companies monitor the conditional of the reefs and maintain mooring buoys, in coordination with government and the Caribbean Natural Resources Institute.

Note: Organization responsible refers to the local (community or government) entity, state or national government agency, or NGO responsible for management of the site or program. Management role of community varies from one program to another because of the need for brevity and the difficulty in obtaining complete sets of data for each program. Community, as used here, refers to local residents, resource users, and tour or dive operators, as appropriate for the site. All the sites noted are relatively successful. Indicators of success are given in a similar table in White et al. (1994).

References used in this table:

Anon 1991
Arquiza and White 1999
Buhat 1994
Carillo and Martinez 1989
Causey 1990
Christie et al. 1990
Christie et al. 1994
Christie et al. 1999
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Ferrer et al. 1996
Geoghean et al. 1991
Hviding 1990; 1991
Hviding and Baines 1992
Katon et al. 1997
Katon et al. 1999
Kelleher 1991
Miller 1986
Post and Van't Hof 1992
Russ and Alcala 1996
Savina and White 1986a; 1986b
Smith and Van't Hof 1991
Smith and Water 1991
Toch 1990
Towle and Rogers 1989
Walker 1992
White 1984
White 1987
White and Savina 1987a; 1987b
White 1988a; 1988b
White 1989
White and Palaganas 1991
White 1992
White and Calumpong 1992
White et al. 1999
White et al. 2000

Critical success factors and policy priorities for sustainable management of coral reefs

Policies and strategies that are frequently used and known to be successful in documented marine management areas are highlighted in Table 6. This analysis helps us prioritize those policies and strategies that, based on experience, deserve the most attention. Those that show up most frequently (in 40 per cent or more cases) as critical success factors in MPAs or in other forms of management areas are listed below in the order of frequency of occurrence in Table 6.

Governance

1. Education support and programs
2. Supportive national policies/laws
3. Periodic monitoring activities
4. Technical planning for biophysical effectiveness and geography
5. Extant national marine protected area mandate
6. Local management or stewardship council
7. Training programs on coastal management
8. National monitoring or rating standards
9. National site selection standards
10. National management standards
11. Valuation tools used to raise awareness or make decisions
12. Information network available
13. Local government or community-based MPA
14. MPA network exists in a supportive context

Regulatory

1. National laws ban or control destructive activities
2. Local laws ban or control destructive activities
3. Local fishing gear restrictions in place
4. Local restricted access in place
5. Local visitor rules applied

Economic

1. Sustainable tourism a theme or policy in area
2. Visitor fees are collected with positive results
3. Boat permit used and effective
4. Alternative livelihood present and used successfully

When reviewing the matrix of Table 6, it is noted that certain policies/strategies marked in black are key supporting factors in many management areas. This does not imply that the others marked in gray, or those less frequent in the table are not important as some, such as national laws that are always present but which may not make the difference in successful management, will automatically be important supporting factors. Some policy/strategy approaches are only starting to be tested and will not show up in this type of analysis, which depends on experience and results over time. An approach such as "CRM certification", being tested in the Philippines, ranks low in the analysis because it is new and not used in other countries.

Table 6. Policies and strategies used with success in marine management areas

		Summary															
		Relative success of mgt./protection	3	2	2	1	1	3	3	3	2	3	1	1	3	2	
		No. of supporting policy regimes	14	9	16	12	16	13	14	25	11	30	17	21	29	15	
Governance	International policies																15 85
	National policies/laws																8
	International MPA																
	National MPA																67
	Local MPA																41
	MPA Network																41
	National ICM program																5
	Local ICM program																28
	Traditional regime																10
	Certification of ICM																5
	Local mgt council																59
	Periodic monitoring																82
	Information network																41
	Training program																54
	Technical planning																79
	National mgt. standard																46
	National site selection standard																49
	National monitoring standard																54
	Lease agreement/mgt. right																23
	Education program																87
	Valuation tools used																44
	Penalties																36
Regulations	Local bans																67
	National bans																85
	Import/export laws																15
	Pollution laws																28
	Local restricted access																59
	National privatization																21
	Traditional restricted access																5
	Local quotas																8
	Local fishing gear restrictions																62
	Local visitor rules																49
	Population mgt.																3
Economic	Sustainable tourism																77
	Visitor fee																69
	Boat permit																51
	Trust fund																10
	Compensation payment																21
	Alternative livelihood																46
	Fines																26
	Pollution tax																0
	Tax write-off																5
	Price incentive for practice																5
	Ecolabeling for practice																3
	Debt for nature swap																8
	Carbon emission tax																8
		Collaborative Management (National/Local Collaboration)															
			1 RMS Rhone, British Virgin Is.	2 Les Arcadins, Haiti	3 Komodo, Indonesia	4 Pulau Seribu, Jakarta Bay	5 Montego Bay, Jamaica	6 Bonaire, Netherlands Antilles	7 Saba, Netherlands Antilles	8 Maldives Resort Islands, Maldives	9 Kosrae Island, Micronesia	10 Apo Island, Negros, P. (post 1996)	11 Apo Reef, Mindoro, P.	12 El Nido, Bacuit Bay, P.	13 Tubbataha Reefs, P.	14 Soufriere, St. Lucia	Relative Frequency of policy/strategy in all 39 cases (%)

Legend:

Relative success of mgt.: **3** Effective management in place for several years
2 Management starting or only moderately effective
1 Little or no management

ICM Integrated Coastal Management
MPA Marine Protected Area
P. Philippines

Note: This table is based on information available which is not consistent for each site analyzed. Thus, specific details in each site can be improved with better knowledge and information of each site. The bigger trends are the important result of this matrix and not the individual details.

Gray box indicates some level of importance in the management of an area
Key policy/strategy with a major influence on success of area

Recommendations made by Burke et al. (2001) highlight the essential need for accurate information and effective management strategies in reef conservation. They maintain that effective resources management requires good information on the status of resources and the factors contributing to change. This information is needed to guide management at local and national levels. Such information and planning can be utilized through ICM or CRM programs that primarily work through co-management of community management regimes involving government and community level groups. Activities that are considered a high priority by Burke et al. (2001) to improve the status of coral reefs in Southeast Asia include efforts to:

- Improve mapping, monitoring and networking of information on coral reefs to support better management
- Halt the use of destructive fishing practices
- Reduce over-fishing
- Regulate the international trade in live reef organisms
- Encourage collaborative management of coastal and fisheries resources
- Improve the management of existing MPAs
- Expand the protected areas networks
- Develop sustainable tourism
- Adopt policies to reduce greenhouse gas emissions and climate change
- Raise public awareness

A factor often overlooked in coral reef management is the need to minimize the impacts of shoreline development and terrestrial pollution. Many significant reefs are found close to the coast, sometimes just a few meters from the shoreline. These reefs are directly affected by rapid population growth and increasing demand for industry, tourism, housing, harbors and ports etc., resulting in extensive coastal development. Furthermore, maintaining the aesthetic value of the coast, including clean beaches and water, and unspoiled landscapes, will become increasingly important if coral reefs themselves become less attractive to tourists. Addressing these issues requires careful attention to planning and regulation of coastal development and waste disposal through ICM and/or community-based resource management programs. Key issues in the protection of reefs from the impacts of shoreline development include:

- Protection and management of watersheds
- Planning and managing shoreline areas and uses
- Providing for sewage and other waste treatment
- Promoting environmentally sensitive building practices
- Promoting environmentally sensitive recreation activities

The list could go on but the key issues and some of their solutions have been highlighted. In summary, 25 years of community and cooperative-based coastal conservation through various forms of MPAs and strategies in the Philippines and other countries have shown that effective coral reef management is more than a problem of simple environmental education or law enforcement. Approaches that mobilize those people who use the resources daily are necessary to ensure wide participation and potentially long-lasting results (Wells and White 1995). Strictly legal approaches have had few successes. Equally, good environmental surveys and information have not been sufficient to bring about rational use of marine resources without being fully integrated into the long-term process of integrated planning and implementation within the context of well-articulated MPAs or other marine management areas. Combining community participation, regulations, environmental education, economic incentives, and legal mandates in a manner appropriate for a particular site together with long-term institutional support from government, non-government groups, academe, or other institutions offers some possibility of success (White et al. 2001).

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